REMARKS

Claims 1, 4-9, 15, 21, 22 have been amended. Claims 1-22 still remain pending in this application.

I. **Rejection of Claims 1-14 and 22 under Section 102**

Claims 1-14 and 22 stand rejected under Section 102 as being anticipated by U.S. Patent No. 5,978,972, issued to Stewart et al.

Claim 1

Referring first to Claim 1, the office action states that Stewart teaches a device for monitoring the acceleration of a body part by a plurality of sensing devices which are positioned orthogonal to the outer surface of the body part to detect acceleration. The office action also states that the sensing devices generate a signal which is sent to a processing device to determine the magnitude and direction of an impact to the body part.

However, Stewart teaches a device and method which is completely different than Applicants' claimed invention, as amended. Stewart discloses a system that employs a fundamentally different methodology for determining the direction of an impact to a body part. First, in similar fashion to Applicants' invention, Stewart employs an array of accelerometers which are disposed *proximate* to the outer surface of a body part. Further, Stewart's accelerometers generate signals which are later processed to determine the direction and magnitude of the impact to the body part.

However, the orientation of the accelerometers in Stewart is completely different than in Applicants' invention. The heart of Stewart's invention is to arrange each of the accelerometers orthogonal *to each other*. In contrast to what is stated in the office action, Stewart's accelerometers are not disposed orthogonal to the outer surface of a body part, as required in Applicants' invention, or to any surface for that matter. In fact, Stewart requires that each of its accelerometers be positioned to sense acceleration in

directions which are orthogonal to each other. See Col. 6, lines 30-33. In Claim 1 of Stewart, it is specifically stated that the first and second acceleration monitoring directions are "orthogonal to each other" and that the third acceleration monitoring direction is "orthogonal to a plane defined by said first and second acceleration-monitoring directions". Since it is known that Stewart's accelerometers are positioned to be orthogonal to each other, the appropriate calculations and data processing can be made to determine impact direction and magnitude.

Stewart merely requires that the accelerometers be positioned *proximal* to the body part. However, Stewart is completely devoid of any teaching that calls for *orienting* the accelerometers relative to the body part. It is this *orientation* of the accelerometers relative to the outer surface of the body that is unique to Applicants' invention.

Claim 1 of Applicants' invention, as amended, specifically requires that the acceleration sensing devices be arranged so that they sense acceleration in directions which are orthogonal to the outer surface of the body part. Unlike Stewart, there is no concern as to the positioning of the accelerometers to each other in the present invention. As a result, Applicants' claimed invention addresses specific problems associated with the prior art, such as the device and method of Stewart. As stated above, Stewart's accelerometers must be precisely positioned orthogonal to each other. This is frequently accomplished by using very expensive tri-axial accelerometers which are permanently set to sense acceleration in three known directions which are orthogonal to each other. Alternatively, less expensive single axis accelerometers can be used in Stewart, however, they must be fixedly secured in a rigid helmet and in known orthogonal locations relative to one another.

The present invention solves the aforementioned problems by employing less expensive accelerometers which are positioned, not orthogonal to each other, but orthogonal to the outer surface of a body part. Claim 1, as amended, of the present

invention clearly requires that the accelerometers detect acceleration in directions which are orthogonal to the outer surface of the body part. Stewart fails to show this. Therefore, Applicants submit that Claim 1 is not anticipated by the prior art and is allowable.

Claim 2

Claim 2 depends from now allowable Claim 1. Therefore, Applicants submit that Claim 2 is now also allowable over the cited prior art.

Claim 3

Claim 3 depends from now allowable Claim 1. Therefore, Applicants submit that Claim 3 is now also allowable over the cited prior art.

Claim 4

Claim 4 depends from now allowable Claim 1. Therefore, Applicants submit that Claim 4 is now also allowable over the cited prior art.

Claims 5-7

As stated above, Stewart only teaches that the accelerometers are proximal to the outer surface of the body part not that they are also orthogonal to the outer surface of the body part. Therefore, Stewart fails to teach a carrier web that carries sensing devices which are positioned orthogonal to an outer surface of body part. In that connection, carrier clips (Claim 6) and the embedding of the sensing devices (Claim 7) to sense acceleration in directions which are orthogonal to the outer surface of a body port are also not taught in Stewart.

Also, Claims 5-7 depend from now allowable Claim 4 which is dependent from now allowable Claim 1. Therefore, Applicants submit that Claims 5-7 are now also allowable over the cited prior art.

Claim 8

The office action states that Stewart discloses three sensing devices positioned 120 degrees apart from one another about the circumference of a body part. In fact, Stewart is completely devoid of such a disclosure. The citation of Fig. 2B and Col. 7, lines 57-60 in the office action do not teach the limitations set forth in Claim 8. The arrangement of the accelerometers in Fig. 2B are not 120 degrees apart from one another. Accelerometers 10 and 12 are, in fact, next to one another on the same side of the body part. Accelerometer 11 is positioned approximately 90 degrees from the accelerometers 10 and 12. The cited passage of Stewart in Col. 7 is unrelated to positioning of the accelerometers relative to a given surface of a body part. It is not surprising that Stewart does not address such positioning because Stewart is only concerned with the positioning of the accelerometers' sensing direction relative *to each other*. In fact, Stewart's invention can be carried out with a cluster of three accelerometers, such as in a tri-axial accelerometer, as long as it is proximal to the body part.

Therefore, Stewart fails to teach the limitations of Claim 8. Also, Claim 8 depends from now allowable Claim 1. Therefore, Applicants submit that Claim 8 is now also allowable over the cited prior art.

Claim 9-14

Claims 9-14 depend, either directly or indirectly, from now allowable Claim 1. Therefore, Applicants submit that Claims 9-14 are now also allowable over the cited prior art.

Claim 22

The office action states that the method of Claim 22 is shown in Stewart at Col. 14, lines 27-42. The office action states that Stewart's first, second and third acceleration measurement directions are orthogonal to the outer surface of the body part. This is

simply not true. Further to the detailed comments made in connection with Claim 1 above, Stewart, in fact, teaches a first and acceleration directions which are orthogonal *to each other* and a third acceleration direction which is orthogonal to a plane formed by the first and second acceleration directions. Stewart has no teaching whatsoever of the acceleration directions being orthogonal to an outer surface of a body part. Such positioning of the accelerometers orthogonal to the outer surface of a body part is completely contradictory to the theory of Stewart's invention which requires the accelerometers' sensing direction to be positioned in a known orthogonal relationship to each other.

Therefore, Stewart fails to teach Applicants' claimed method in Claim 22. As a result, Applicants submit that Claim 22 is now allowable over the prior art.

In view of the foregoing, Stewart et al. '972 fails to anticipate Claims 1-14 and 22 under Section 102(b). Applicants submit that Claims 1-14 and 22, as amended, are now allowable over the cited prior art.

II. **Rejection of Claims 15-21 under Section 103(a)**

Claims 15-21 stand rejected under Section 103 as being unpatentable over Stewart et al. in view of Vogt.

The office action states that Stewart discloses a method for determining the magnitude and direction of an impact to a body part having a geometric shape where the accelerometers are not only proximate to the outer surface of the body part but also sense acceleration in directions which are orthogonal to the surface of the body part. The office action cites Col. 15, lines 63-67 in support of this statement. It is also stated that Stewart does not disclose a method that uses a hit profile function from a geometric shape of the body part and to process the data obtaining by comparing the hit results to acceleration data and best fit matching to determine best fit hit results to finally determine the magnitude and direction of the impact to the body part.

Vogt is cited for the general disclosure of a profile function and potential results form the profile function and comparing the results to the senses data for best fit matching to determine a best fit using a least-square regression model. The office action states that Vogt does not teach any of the details of Applicants' invention that relate to employing a hit profile that corresponds to a geometric shape of the body part or using the specific claimed hit profile function of *a*cos(s-b) + c*. The office action further states that, despite the lack of disclosure in Stewart and Vogt, that:

> "it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have applied the method of Vogt into the method of Stewart et al. for simulating the magnitude and direction of impact to a body part comprising a plurality of accelerometers in a defined arrangement about the surface of a body part in a real time to provide specific data as to actual human injuries during physical activity".

As repeatedly stated above, Stewart teaches a model and methodology to determine the magnitude and direction of an impact by positioning accelerometers orthogonal to one another. As a result, the positioning of the accelerometers relative to the outer surface of a body part in Stewart is completely irrelevant. Vogt merely teaches using a profile for predictive output based on sensor input. However, Vogt is devoid of any disclosure that concerns the direction and magnitude of an impact to a body part or the use of a geometric shape to approximate the body part itself.

Stewart senses the magnitude and direction of an impact by uses the known positioning of the accelerometers orthogonal to each other to collect data for later processing. Stewart's invention operates independently from the type and shape of the body part to which it is attached. In other words, details of the body part, that is being sensed, is of no concern in Stewart's invention. Thus, Stewart has no desire at all to use any type of hit profile function that corresponds to the geometric shape of a body part. There is no suggestion or teaching in Stewart to employ such a hit profile function nor is

there such a teaching in Vogt to support the combination suggested in the office action. In fact, Stewart teaches away from using a hit profile function due to the use of accelerometers which are positioned orthogonal to each other.

The office action admits that Vogt does not teach a hit profile function of the geometric shape of the body part. Claim 15 specifically requires that a hit profile function be provided from the geometric shape of the body part to sense acceleration in directions which are each orthogonal to the outer surface of the body part. Even if Stewart and Vogt were combinable under Section 103, the resultant combined teaching still clearly fails to teach Applicants' claimed invention in Claims 15-21, as amended. Applicants' invention employs a new, novel and unobvious method of sensing acceleration in directions which are orthogonal to the outer surface of the body part. Since the outer surface of the body part is employed in Applicants' method, the geometry of the outer surface of the body part is a critical factor which must be taken into consideration. Thus, Claim 15, as amended, requires the use of a hit profile function from the geometric shape of the body part in question. Not surprisingly, Stewart and Vogt both fail to teach this step of Applicants' unique method of processing the results to determine the magnitude and direction of the impact to the body part.

Therefore, even assuming Stewart and Vogt are combinable under Section 103, they still fail to teach Applicants' claimed invention, as amended. Therefore, Claims 15-21 are patentable over the combination of Stewart and Vogt.

III. Conclusion

Applicants submit that Claims 1-22, as amended, are allowable over the cited prior art. In view of the above, Applicants submit that pending Claims 1-22 are now in condition for allowance. Reconsideration of the Rejections and Objections are requested. Allowance of Claims 1-22 at an early date is solicited.

If an extension of time is required for timely submission of this response, Applicant hereby petitions for an appropriate extension of time and the Office is authorized to charge Deposit Account 02-0900 for the appropriate additional fees in connection with the filing of this response.

The Examiner is invited to telephone the undersigned should any questions arise.

Respectfully submitted,

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